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(54) **METHOD AND SYSTEM FOR ENABLING AN AUTHORIZED VEHICLE DRIVEAWAY**

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CPC ***B60R 25/04*** (2013.01)

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CPC G05B 19/00; H04Q 1/00; H04W 4/00
USPC 340/539, 19, 5.7, 426.3, 5.62, 5.52, 340/5.54; 455/569.2
See application file for complete search history.

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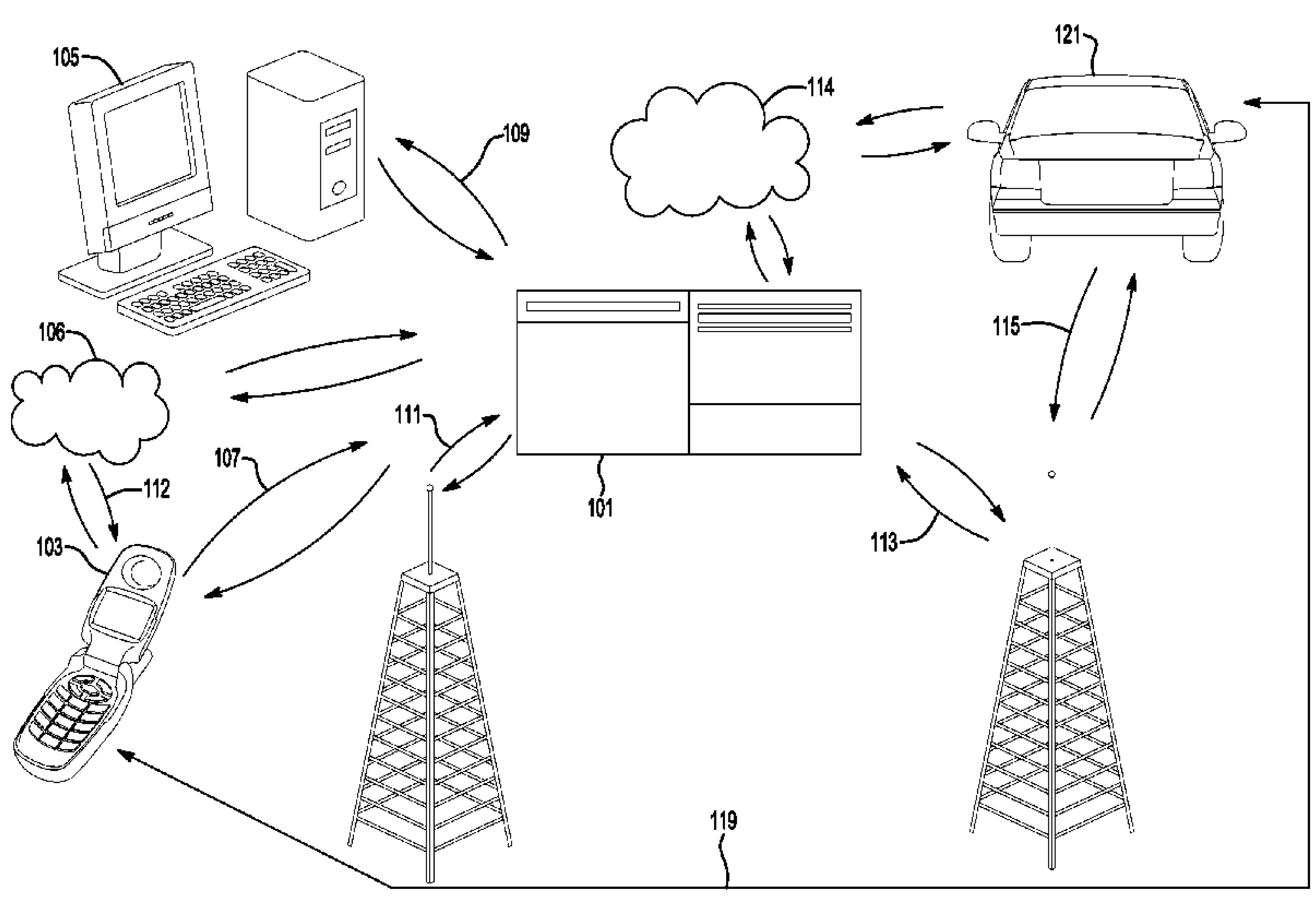
(57) **ABSTRACT**

Various embodiments may include methods and system for enabling an authorized vehicle driveaway. A vehicle driveaway authorization code for authorizing a vehicle to be driven and a user authorization code that corresponds to the vehicle driveaway authorization code may be generated. The codes may be generated by, for example, at least one server configured to generate the authorization codes. The at least one server may be communicating with a nomadic device and a vehicle driveaway authorization system. A vehicle driveaway request signal may be received. In response to a receipt of the vehicle driveaway request signal, the vehicle driveaway authorization code may be transmitted to the vehicle driveaway authorization system and the user authorization code may be transmitted to the nomadic device for input to the vehicle driveaway authorization system in order to enable the vehicle to be driven.

14 Claims, 6 Drawing Sheets



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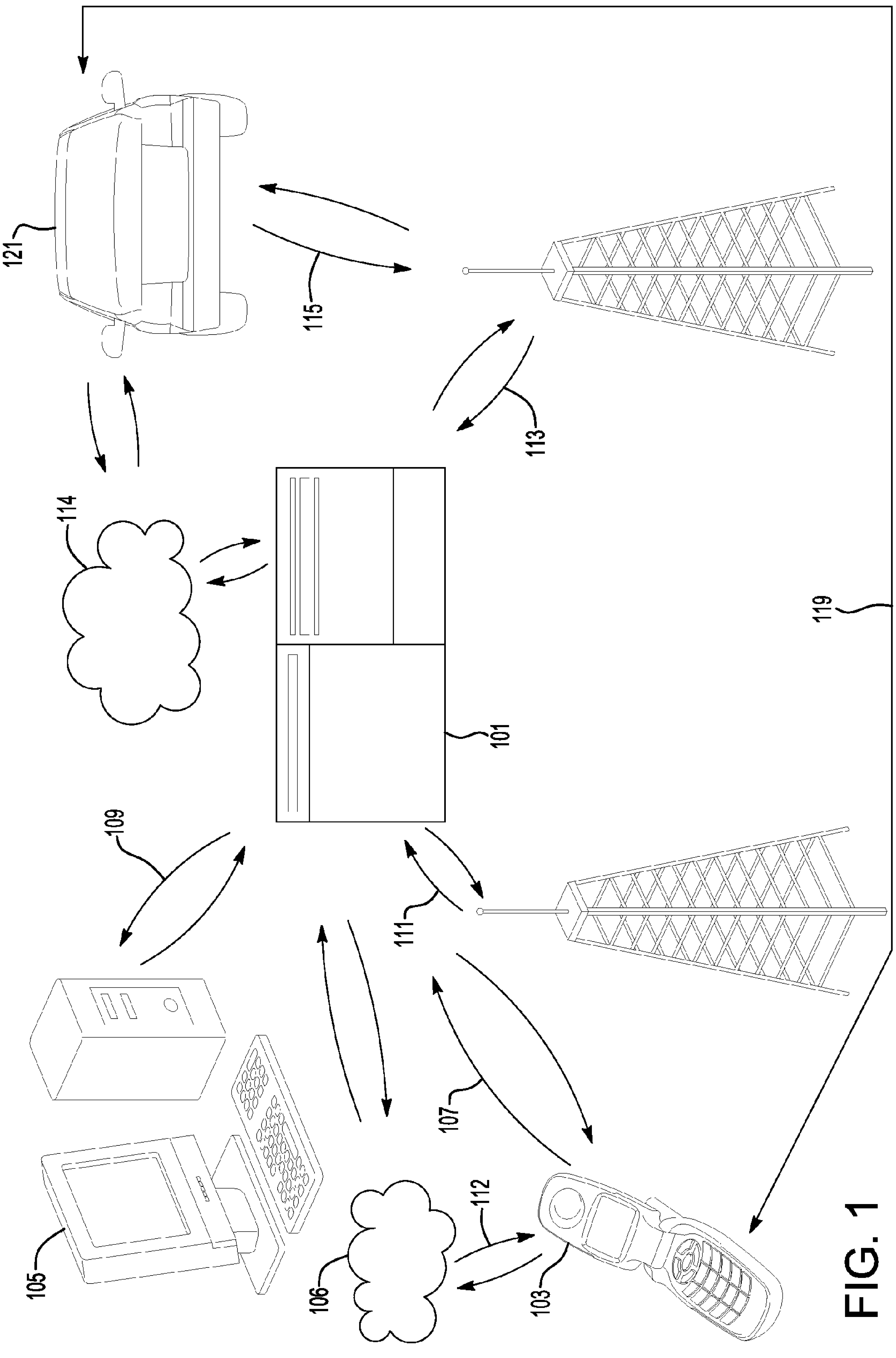

FIG. 1

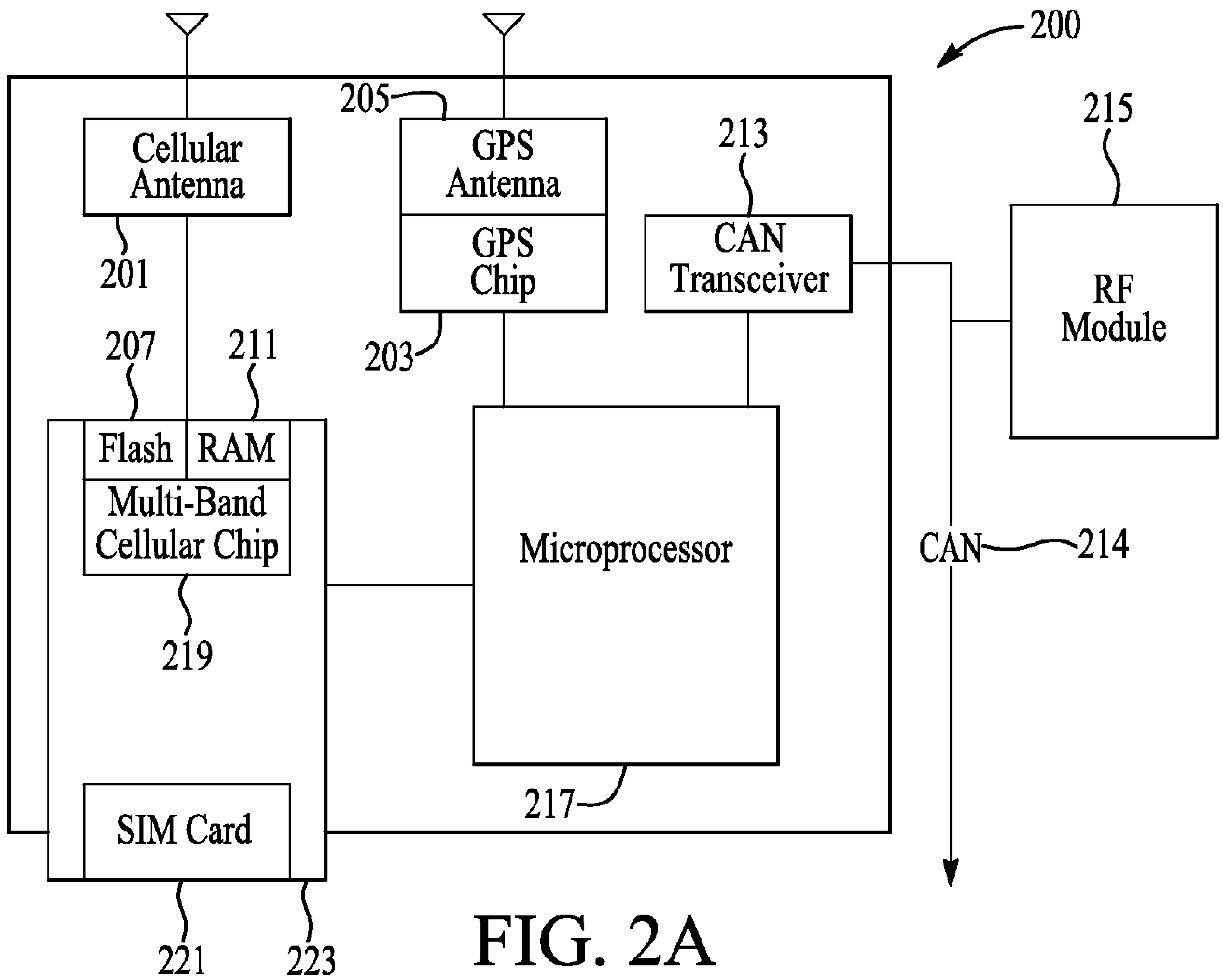
200
Cellular Antenna
201
205
GPS Antenna
GPS Chip
203
213
CAN Transceiver
215
RF Module
207
211
Flash
RAM
Multi-Band Cellular Chip
219
Microprocessor
CAN
214
SIM Card
217
221
223

FIG. 2A

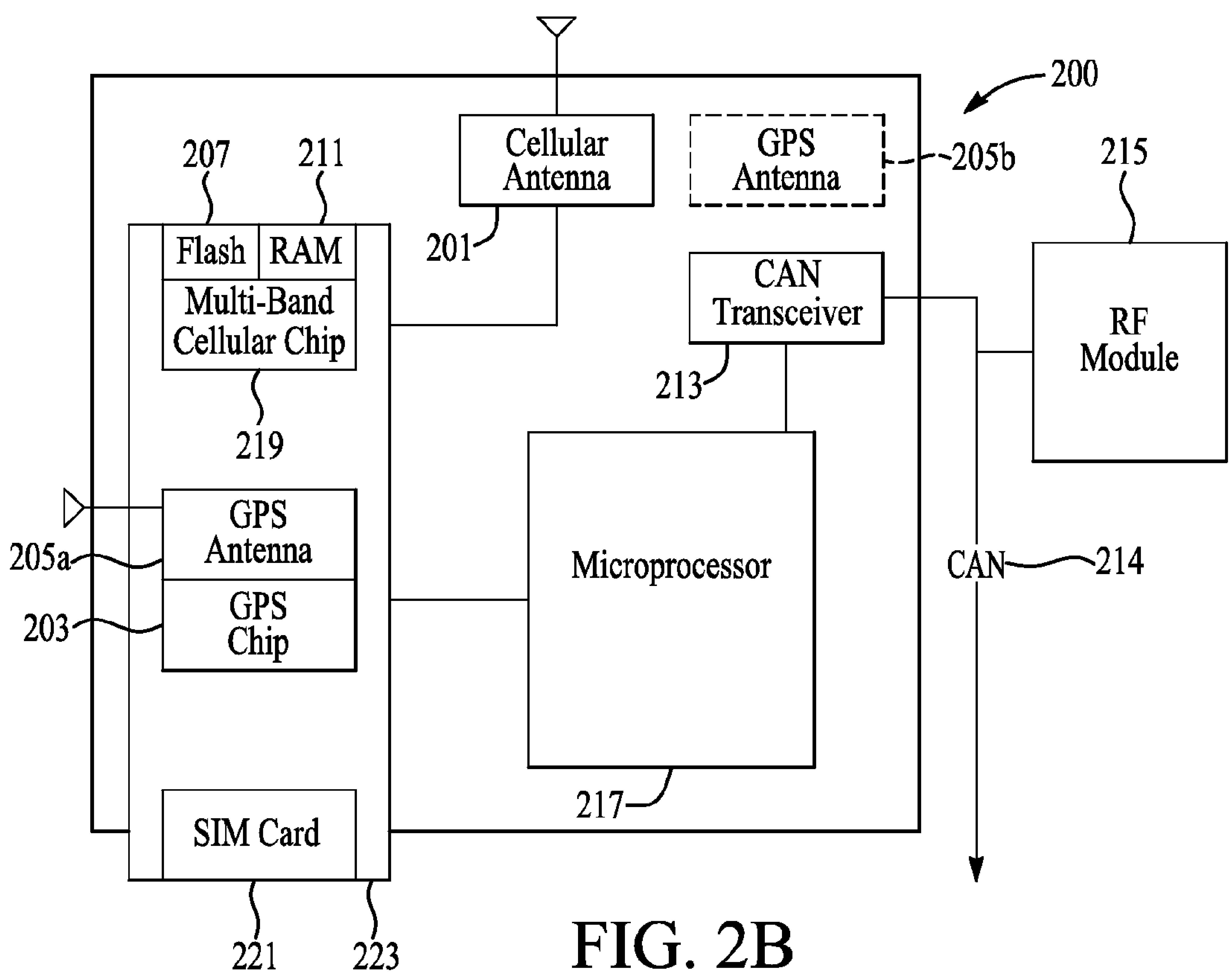
200
207
211
Cellular Antenna
201
GPS Antenna
205b
215
Flash
RAM
Multi-Band Cellular Chip
219
CAN Transceiver
213
RF Module
GPS Antenna
205a
GPS Chip
203
Microprocessor
CAN
214
SIM Card
217
221
223

FIG. 2B

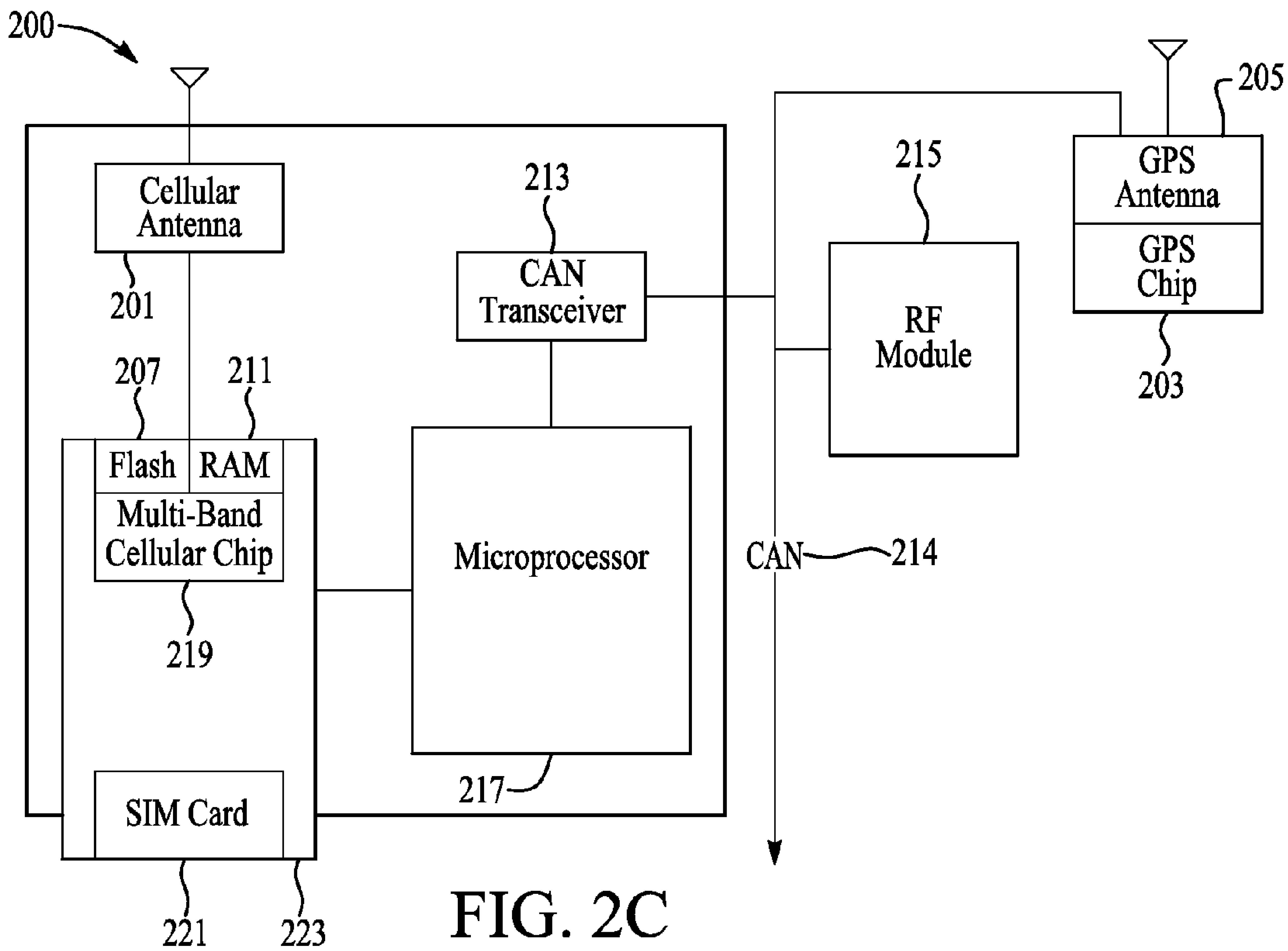
200
205
Cellular Antenna
213
215
GPS Antenna
CAN Transceiver
GPS Chip
201
RF Module
203
207
211
Flash
RAM
Multi-Band Cellular Chip
Microprocessor
CAN
214
219
SIM Card
217
221
223

FIG. 2C

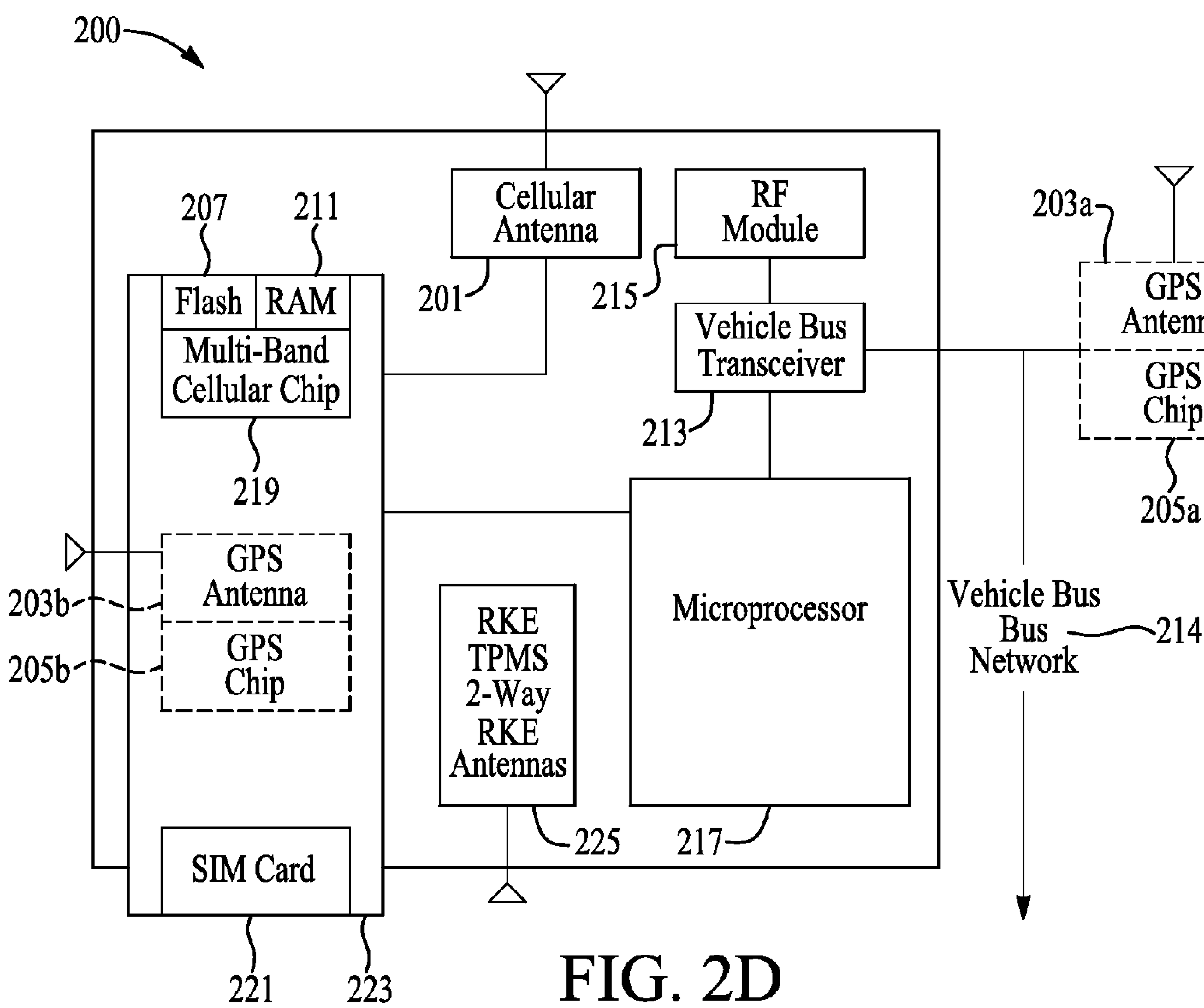
200
207
211
Cellular Antenna
RF Module
203a
Flash
RAM
201
215
GPS Antenna
Multi-Band Cellular Chip
Vehicle Bus Transceiver
GPS Chip
213
219
205a
GPS Antenna
203b
GPS Chip
205b
RKE TPMS 2-Way RKE Antennas
Microprocessor
Vehicle Bus Bus Network
214
225
217
SIM Card
221
223

FIG. 2D

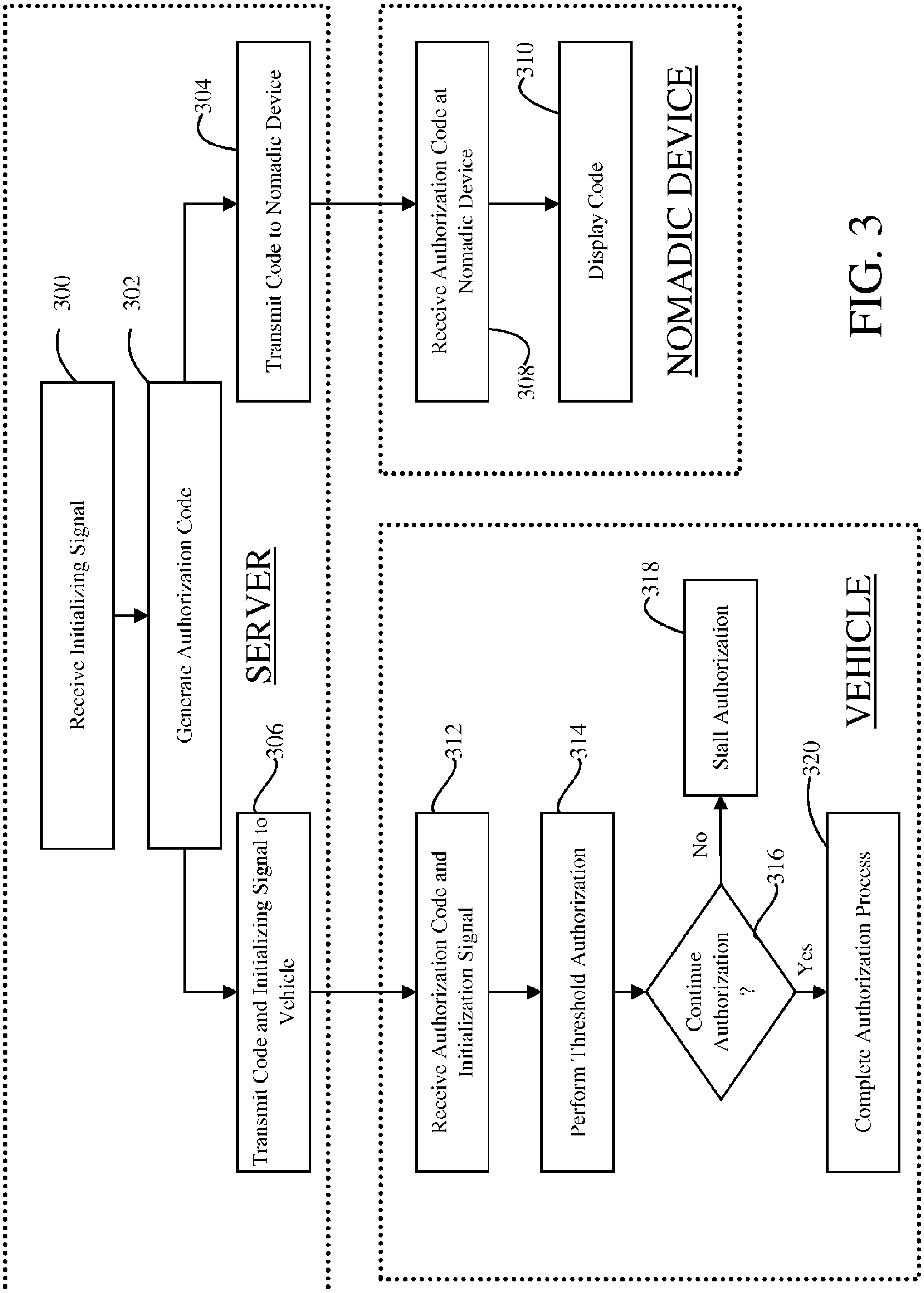
SERVER
Receive Initializing Signal
300
Generate Authorization Code
302
Transmit Code to Nomadic Device
304
Transmit Code and Initializing Signal to Vehicle
306
NOMADIC DEVICE
Receive Authorization Code at Nomadic Device
308
Display Code
310
VEHICLE
Receive Authorization Code and Initialization Signal
312
Perform Threshold Authorization
314
Continue Authorization ?
316
No
Yes
Stall Authorization
318
Complete Authorization Process
320

FIG. 3

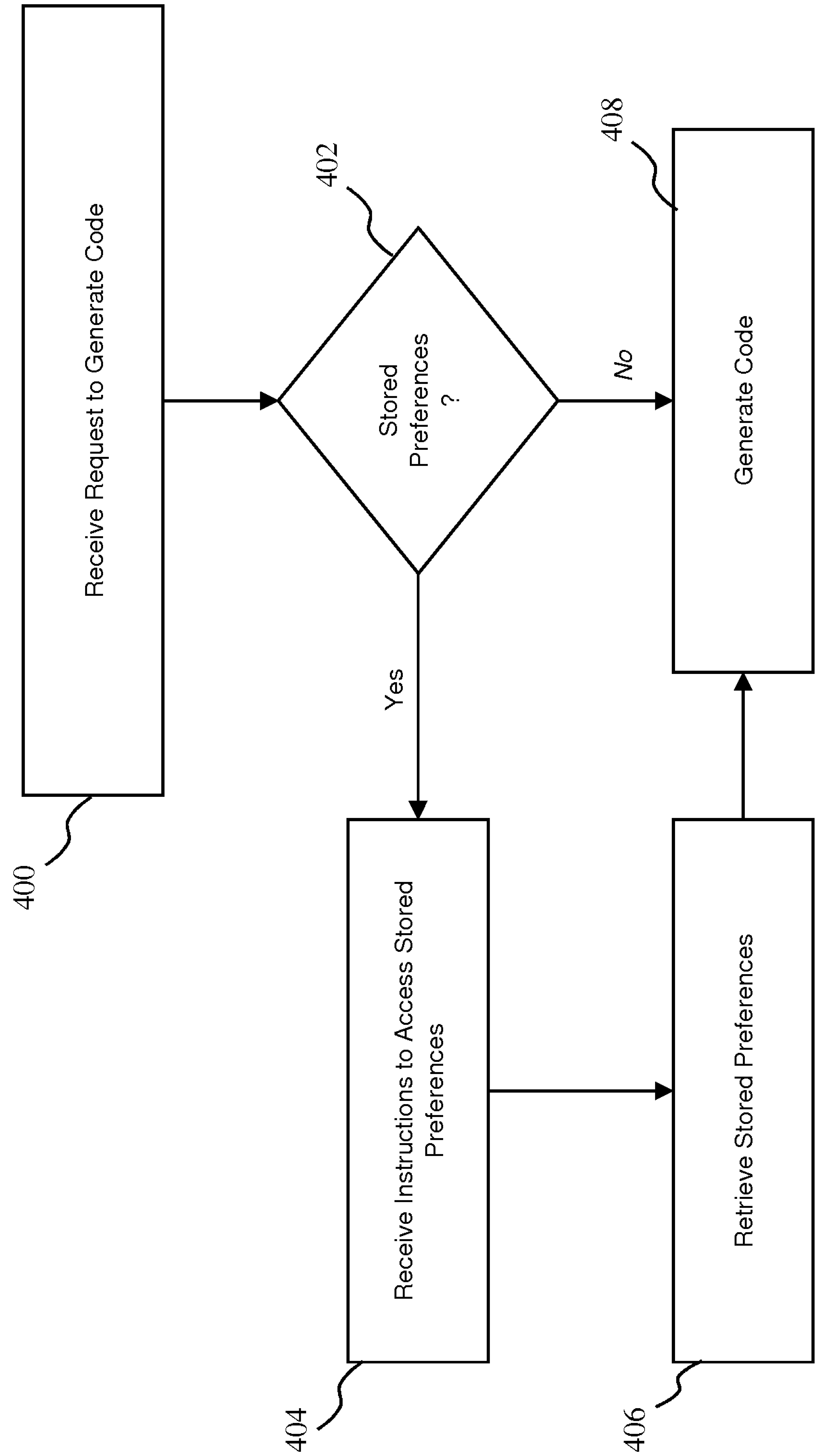
Receive Request to Generate Code
400
Stored Preferences ?
402
Yes
No
Receive Instructions to Access Stored Preferences
404
Retrieve Stored Preferences
406
Generate Code
408

FIG. 4

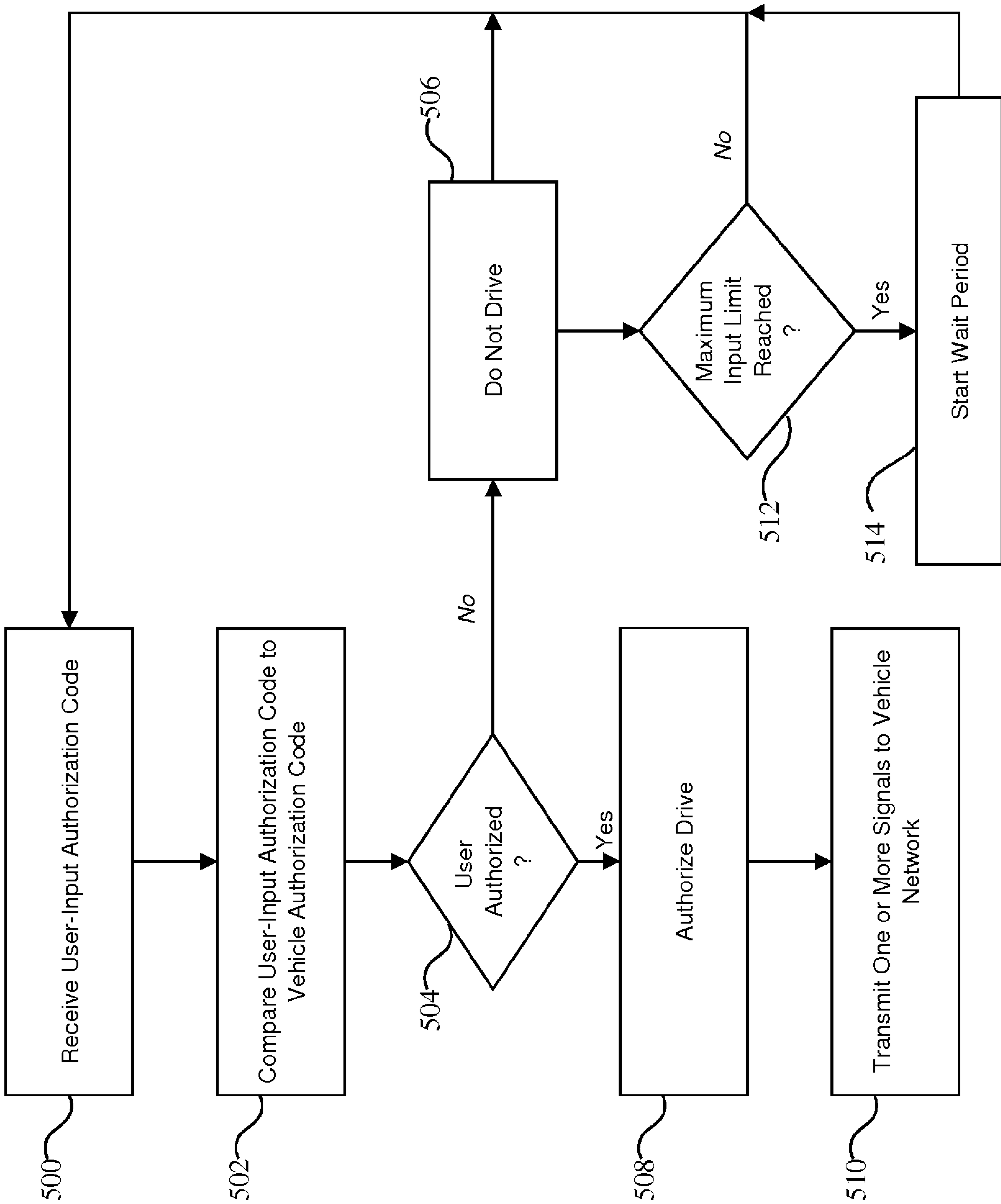
500
Receive User-Input Authorization Code
502
Compare User-Input Authorization Code to Vehicle Authorization Code
504
User Authorized ?
No
Yes
506
Do Not Drive
508
Authorize Drive
510
Transmit One or More Signals to Vehicle Network
512
Maximum Input Limit Reached ?
No
Yes
514
Start Wait Period

FIG. 5

METHOD AND SYSTEM FOR ENABLING AN AUTHORIZED VEHICLE DRIVEAWAY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 12/719,047 filed Mar. 8, 2010, now U.S. Pat. No. 8,614,622 issued on Dec. 24, 2013, the disclosure of which is incorporated in its entirety by reference herein.

TECHNICAL FIELD

The embodiments described herein generally relate to a method and system for enabling an authorized vehicle driveaway.

BACKGROUND

In one conventional remote start system, a driver may toggle a switch on a key fob while positioned away from a vehicle to enable the vehicle to start. In this example, the key fob transmits (i.e., a one-way transmission) a long range radio frequency (RF) command signal (e.g., meters to miles) to a receiver positioned within a controller in the vehicle such that the controller validates the integrity of the RF signal prior to enabling the vehicle to start. The RF command may include various security aspects such as a rolling code protocol. After the RF command signal is validated, the vehicle may start. The driver may also toggle another switch on the key fob to unlock door(s) of the vehicle after the vehicle is started to gain entry into the vehicle.

To ensure that the authorized driver is now in the vehicle after the vehicle is started with the key fob, the driver may be required to insert a key into an ignition switch prior to the vehicle shifting from park to drive. When the key is inserted into the ignition switch and is manually rotated, an RF validation occurs between the controller in the vehicle and a transponder in the key. In this example, the controller may be positioned within 25-50 mm to the ignition switch and the RF validation between transponder on the key and the controller occurs over this short distance. By requiring the RF validation to occur over a short distance coupled with the rotation of the key ensures that the driver is authorized to drive the vehicle and serves as a mechanism to ensure that the driver is "tethered" (or anchored) to the vehicle. The tethering notion further serves to ensure that the driver is indeed authorized to start the vehicle.

In another conventional vehicle start system, a passive entry passive start (PEPS) operation may occur to start the engine of the vehicle. In the PEPS operation, the key fob (or smart fob) may be implemented as a 2-way device. Meaning, the smart fob may receive and transmit frequency based signals. For example, the smart fob and the controller may communicate via low frequency (LF) signals in the event the smart fob and the controller are detected to be in close proximity to one another (e.g., 1 to 3 meters). After the controller has confirmed that the smart fob is an authorized device, the controller may unlock the vehicle to enable the holder of the smart fob to gain entry into the vehicle. Once the driver is in the vehicle, another RF validation may occur between the smart fob and controller to initiate the process and allow the driver to start the vehicle. The driver may then press a brake pedal (assuming the smart fob is validated while in the vehicle) and a push button start switch to start the vehicle. In general, the validation that occurs over the short distance between the smart fob and the controller, coupled with the brake pedal operation, validates that the driver is indeed an authorized driver and is within the vehicle cabin and, more particularly, within the driver's seat. The PEPS operation serves as a mechanism that the driver is "tethered" to the vehicle. The tethering notion serves to ensure that the driver is indeed authorized to start the vehicle.

SUMMARY

One aspect may include a computer system having at least one server in communication (e.g., and without limitation, over a telecommunications network) with a nomadic device and a vehicle driveaway authorization system. The at least one server may be configured to generate a vehicle driveaway authorization code for authorizing a vehicle to drive and a user authorization code that corresponds to the vehicle driveaway authorization code.

The at least one server may be further configured to receive a vehicle driveaway request signal. The vehicle driveaway request signal may include, for example, a door unlock signal. In some embodiments, the vehicle driveaway request signal may be a user-issued command signal which may be transmitted from a nomadic device.

In response to a receipt of the vehicle driveaway request signal, the at least one server may be configured to transmit the vehicle driveaway authorization code to the vehicle driveaway authorization system and the user authorization code to the nomadic device. Further, the at least one server may be further configured to additionally transmit at least a portion of the vehicle driveaway request signal. In some embodiments, upon receipt of the vehicle driveaway request signal, the vehicle driveaway authorization system may be configured to transmit one or more signals to permit entry into the vehicle.

The user authorization code may be input to the vehicle driveaway authorization system and the vehicle driveaway authorization code may be compared to the user authorization code upon the user authorization code being input to the vehicle driveaway authorization system. If the vehicle driveaway authorization code corresponds to the user authorization code, the vehicle is authorized to be driven. In some embodiments, the vehicle driveaway authorization code and the user authorization code may be generated upon a receipt of the vehicle driveaway request signal.

The vehicle driveaway authorization code and the user authorization code may be selected from the group consisting of a numerical code, an alphanumeric code, one or more maneuvers in the vehicle, voice recognition, a graphical code, a color code, a question and answer combination, a fingerprint scan, or combinations thereof. Further, the user authorization code may be input using one or more of a vehicle keypad, a touch screen display, one or more radio button presses, one or more voice commands, a fingerprint scanner, vehicle brakes, one or more vehicle lights, a vehicle horn, or a combination thereof.

Another aspect may include a vehicle driveaway authorization method. The method may include generating one or more vehicle driveaway authorization codes for authorizing a vehicle drive and generating one or more user authorization codes that correspond to the one or more vehicle driveaway authorization codes. The method may also include receiving a vehicle driveaway request signal.

In response to receiving the vehicle driveaway request signal, one or more vehicle driveaway authorization codes may be transmitted to a vehicle driveaway authorization system and the one or more user authorization codes may be transmitted to a nomadic device for input to the vehicle driveaway authorization system. Accordingly, a vehicle drive may

be enabled based on a comparison by the vehicle driveaway authorization system of the one or more user authorization codes and the one or more vehicle driveaway authorization codes and correspondence between the one or more user authorization codes and the one or more vehicle driveaway authorization codes.

The one or more vehicle driveaway authorization codes and the one or more user authorization codes may be randomly-generated. In some embodiments, at least two vehicle driveaway authorization codes and at least two user authorization codes may be generated. The at least two user authorization codes may include a (i) user-input user authorization code and (ii) a wireless signal (e.g., and without limitation, a BLUETOOTH signal, a WiFi signal, or a near field communication signal) including at least one of a rolling code or a fixed code.

In some embodiments, the authorization method may further include receiving a security level value for the authorization method. The complexity of the authorization method may correlate with the security level value. Furthermore, the security level value may establish a complexity of the vehicle driveaway authorization code and the user authorization code.

Another aspect may include a method including generating a driveaway authorization code and a user authorization code corresponding to the driveaway authorization code. Furthermore, a driveaway request signal may be received. Responsive to receiving the request signal, the driveaway authorization code may be transmitted to a driveaway authorization system and the user authorization code may be transmitted to a nomadic device for input to the authorization system. In some embodiments, the driveaway request signal may be also transmitted. A vehicle drive may thereby be enabled based on a comparison and correspondence of the driveaway authorization and the user authorization codes.

Another aspect may include a vehicle driveaway authorization system which may include at least one server that may be configured to generate a vehicle driveaway authorization code and a user authorization code. The at least one server may be further configured to transmit over a telecommunications network (1) the vehicle driveaway authorization code to at least one vehicle computer and (2) the user authorization code to a nomadic device.

The vehicle driveaway authorization system may further include at least one wireless nomadic device configured to receive the user authorization code.

The vehicle driveaway authorization system may additionally include at least one vehicle computer which may be configured to wirelessly receive the vehicle driveaway authorization code for authorizing a vehicle drive. The vehicle driveaway authorization code may correspond to the user authorization code. An input may be received at the vehicle defining the user authorization code. Further, an identifying signal may be wirelessly received to identify the wireless nomadic device in a vicinity of a vehicle.

Based on the identifying signal, it may be determined whether the wireless nomadic device was previously wirelessly paired with the vehicle.

The at least one vehicle computer of the vehicle driveaway authorization system may be further configured to compare the vehicle driveaway authorization code to the user authorization code. If the nomadic device was previously wirelessly paired with the vehicle and if the vehicle driveaway authorization code corresponds to the user authorization code, the at least one vehicle computer may be further configured to enable the vehicle to be driven.

Another aspect may include a vehicle driveaway authorization method. The authorization method may include generating a vehicle driveaway authorization code and a user authorization code. The vehicle driveaway authorization code may be transmitted over a telecommunications network to at least one vehicle computer and (2) the user authorization code may be transmitted over a telecommunications network to a nomadic device. The user authorization code may be received at the nomadic device.

The method may further include receiving the vehicle driveaway authorization code at a vehicle computer for authorizing a vehicle drive. The vehicle driveaway authorization code may correspond to the user authorization code.

Input to the vehicle computer may be received defining the user authorization code. Further, an identifying signal may be wirelessly received to identify the nomadic device in a vicinity of a vehicle.

A determination may be made whether the nomadic device was previously wirelessly paired with the vehicle based on the identifying signal. Further, the vehicle driveaway authorization code may be compared to the user authorization code.

If the nomadic device was previously wirelessly paired with the vehicle and if the vehicle driveaway authorization code corresponds to the user authorization code, the method may further include enabling the vehicle to be driven.

These and other aspects will be better understood in view of the attached drawings and following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The figures identified below are illustrative of some embodiments of the invention. The figures are not intended to be limiting of the invention recited in the appended claims. The embodiments, both as to their organization and manner of operation, together with further object and advantages thereof, may best be understood with reference to the following description, taken in connection with the accompanying drawings, in which:

FIG. **1** shows an illustrative example of a communication system through which a nomadic device can communicate with a vehicle according to one of the various embodiments;

FIGS. **2**A-D show illustrative examples of vehicle-based communication devices that provide communication to a remote network according to one of the various embodiments;

FIG. **3** illustrates a vehicle operation/driveaway authorization process according to one of the various embodiments;

FIG. **4** illustrates a code generation operation according to one of the various embodiments; and

FIG. **5** illustrates a vehicle operation/driveaway authorization process according to another one of the various embodiments of the present invention.

DETAILED DESCRIPTION

Detailed embodiments of the invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of an invention that may be embodied in various and alternative forms. Therefore, specific functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or as a representative basis for teaching one skilled in the art to variously employ the present invention.

A cellular phone (or other suitable apparatus) may be used as a device to permit entry into a vehicle and/or remote start of the vehicle. When a driver uses only a nomadic device to start or enter a vehicle, some challenges may arise in order to authorize a drive away of the vehicle. For example, one non-limiting challenge is positively detecting a phone of an approved driver and validating that the driver is either in the vehicle driver seat or in the vehicle's cabin. Another non-limiting example is verifying that the phone is in the cabin and preventing someone already in the cabin from being able to drive the vehicle away if a person with a valid matched phone outside the cabin starts the vehicle but has not yet arrived to the running vehicle.

Various embodiments described herein may, among other things, validate that the holder of a cell phone or other suitable device is authorized to start the vehicle and that such a holder is in the cabin of the vehicle and is authorized to drive the vehicle. It is contemplated that the embodiments described herein may be utilized for purposes other than those described and that challenges or problems noted herein are not intended to be an exhaustive list of problems that may be overcome by the embodiments of the present invention. Such challenges or problems as noted herein are noted for illustrative purposes and that all of the challenges or problems that may be overcome by the various embodiments of the present invention are not described for purposes of brevity.

FIG. **1** shows an illustrative example of a communication system through which a nomadic device can communicate with a vehicle **121**. In this illustrative embodiment, a nomadic device (e.g., without limitation, a cellular phone) **103** is used to send a communication through a cellular network **107**. This communication is relayed through a network **111** (e.g., without limitation, the cellular network, the internet, etc.) to a centralized system **101**. In another embodiment, the nomadic device **103** may send a communication through network **112** which may include, but is not limited to, WiFi or WiMax. This communication is relayed through a network **106** (e.g., without limitation, the internet,) to a centralized system **101**.

In this illustrative embodiment, the centralized system is a server system that includes processing capability for incoming nomadic device signals designated to interact with a remote vehicle **121**.

For example, the server(s) **101** may include an automated call server and/or web host. Further, the server(s) **101** may route an incoming signal from a nomadic device (ND) **103** to the appropriate remote vehicle. Data sent in this fashion may be sent using data-over-voice, a data-plan, or in any other suitable format.

Data can also be sent to the remote vehicle **121** through the server(s) **101** using a personal computer **105**. In this case, the data is likely, although not necessarily, sent over the internet **109**.

Once the server(s) **101** receive the incoming data request from the remote source **103**, **105**, the message is processed and/or relayed to a vehicle **121**. The vehicle may be identified by a header associated with one or more incoming data packets, or may be identifiable based on a database lookup, for example.

In one embodiment, a message is relayed to the remote source **103**, **105** as well. For example, as will be described in further detail below, when an authorized user remotely transmits a request from a nomadic device **103** (e.g., via a button or key press) to receive authorization to operate and drive away the vehicle **121**, the server(s) **101** may respond by transmitting an authorization code to both the nomadic device **103** and to the vehicle **121** for input by the authorized user at the vehicle **121**. An authorized user may be any individual recognized by the vehicle **121** as an authorized user based on a fingerprint scan, an authorized code, voice recognition, and the like. It should be understood that these examples are non-limiting and other means of authorization may be used.

The relay to the vehicle **121** is sent out from the server(s) **101** through a network (e.g., without limitation, a cellular network **113**, the internet, etc.) and passed through a cellular network **115** to the vehicle **121**. In another embodiment, the relay may be passed through network **114** (e.g., WiFi or WiMax) and to the vehicle **121**. A remote communication module **200** in the vehicle **121** receives the signal sent from the server(s) **101** and processes it or relays it to an appropriate processing system within the vehicle **121**.

In at least one illustrative embodiment, the vehicle **121** is also outfitted with a communication transceiver, such as, but not limited to, a BLUETOOTH transceiver. This transceiver may allow communication with the nomadic device **103** using a direct signal **119**.

It should be understood that the communication between nomadic device **103**, server **101**, and vehicle **121** may be performed in a number of ways and FIG. **1** is presented for illustrative purposes. FIG. **1** illustrates various alternatives for communicating data. For example, and without limitation, data communication may be partially or entirely cellular or WiFi, or a combination of cellular and WiFi.

FIGS. **2**A-D show illustrative examples of vehicle-based communication modules that provide communication to a remote network.

FIG. **2**A shows an illustrative example of a communication module **200** combined with a GPS module, wherein a cellular module and GPS are on different boards.

In this illustrative embodiment, a communications module **200** can include a cellular (e.g., and without limitation, GSM or CDMA) antenna **201** that communicates with a remote server over a cellular network. The received cellular signal may be sent from the cellular antenna **201** to a multi-band cellular (e.g., and without limitation, GSM or CDMA) decoder **219** that processes the received signal to produce information usable by the microprocessor **217**.

In this illustrative embodiment, the multi-band cellular chip **219**, including flash memory **207** and RAM **211**, is installed in the module as part of a removable device **223** including a SIM card **221**. The SIM card **221** may contain user identifying information that allows access to the cellular network under a particular user's plan.

Additionally, the module includes a GPS chip **203** that can process and decode a signal from the GPS antenna **205** and send this information to a microprocessor **217**.

The microprocessor is also in communication with a vehicle data bus that provides access to various vehicle modules, such as RF module **215**. Other modules not shown include, but are not limited to, the vehicle cluster, a remote (off-board) GPS system, a radio module, etc. Non-limiting examples of a vehicle data bus include an SAE J1850 bus, a CAN bus, a GMLAN bus, and any other vehicle data buses known in the art. For illustration purposes only, FIGS. **2***a*-**2***d* are represented as using a CAN bus.

FIG. **2**B shows a second exemplary embodiment in which a cellular chip and GPS are on the same board **223**. In this illustrative embodiment, the removable board (this board may also be permanently attached to the module) **223** may contain the SIM card **221**, a GPS module including a GPS chip **203** and a GPS antenna **205***a*, and the Multi-band cellular chip **219** including flash memory **207** and RAM **211**.

In another embodiment, the GPS antenna **205***b* may be attached to the module separately from this board **223**. When a signal comes in from the cellular antenna **201** and/or the GPS antenna **205***b*, the signal may be sent to the corresponding cellular/GPS chip **203** for processing, and then passed to the microprocessor **217**. The microprocessor **217** interfaces with the CAN transceiver **213** to connect to a vehicle network **214** and vehicle modules such as RF module **215**.

FIG. **2**C shows yet another exemplary embodiment in which the cellular module is standalone. In this illustrative embodiment, the GPS module containing the GPS antenna **205** and the GPS chip **203** may connect to the microprocessor **217** through the CAN transceiver **213**. Other vehicle modules, such as an RF module **215** can also connect to the microprocessor through the CAN transceiver **213**.

In this illustrative embodiment, the removable board **223** may contain a SIM card **221** and a multi-band cellular chip **219**, as well as a flash memory **207** and RAM **211**. Signals from the cellular antenna **201** may be sent to the board **223** for processing by the multi-band cellular chip **219** before being sent to the microprocessor **217**.

FIG. **2**D shows still another exemplary embodiment in which a cellular module is combined with an RF module **215** in the communications module **200**. The RF module **215** may continue to talk to the microprocessor **217** through the CAN transceiver **213**. In this illustrative embodiment, the GPS module, including the GPS antenna **203***a*, **203***b* and GPS chip **205***a*, **205***b* can be located within the communications module **200** or located elsewhere in the vehicle, in which case it may communicate with the microprocessor **217** through the CAN transceiver **213**.

Again, in this embodiment, the cellular antenna **201** may send a signal to the multi-band cellular **219**, including flash memory **207** and RAM **211**. The signal may be processed and sent to the microprocessor **217**. The multi band cellular chip **219** may be located on a removable circuit board **223**, which may also include a SIM card **221**.

FIG. **3** illustrates an exemplary authorization process for authorizing the entry and operation (i.e., drive away) of a vehicle. The server(s) **101** may receive an initializing command as illustrated in block **300**. The initializing command may identify to the server **101** and/or vehicle **121** that a request to authorize drive away of the vehicle is being made by a user from the authorized nomadic device **103**.

In one embodiment, the initializing command may operate to "wake up" the server(s) **101** and/or the communication module **200**. The "wake up" signal may indicate that an entry and drive authorization is requested.

The initializing command may be a signal sent to the server **101** in response to a user input. User input may include, but is not limited to, a button press, a voice command, a touchscreen selection, or a finger-print scan. The user may input the initializing command by selecting, for example (and without limitation), an "unlock & drive" option from a selectable menu option or reciting a predetermined or user-defined word such "authorize" or "unlock and drive." In one embodiment, the ND **103** may be equipped with a shortkey or "hot button" for initializing the authorization system.

In one embodiment, biometrics may be utilized for initializing the authorization process and/or performing the authorization process (as described below). For example, the user may scan a fingerprint (e.g., at the ND **103**) and, if a match is found, the scan may serve as an initializing command. The counterpart matching fingerprint scan may be stored on the ND **103** or on the server **101** for transmission to the vehicle. When the user input scan and the stored scan are compared and a match is found (e.g., by performing the comparison at the server **101**), instructions that identify the presence of the match may be transmitted for initializing the authorization process and/or enabling operation or drive of the vehicle. In one embodiment, the initialization command process and/or the authorization process may include a bypass option for bypassing the input of a biometric identifier. For example, the user may input a bypass code at the vehicle **121**, ND **103** and/or PC **105**.

The biometric code may be stored in the vehicle authorization system's memory and the comparison may be performed entirely at the vehicle **121**. As such, the initializing command may be activated and/or the authorization process may be performed (as described below) entirely at the vehicle **121**. The biometric code may be stored in memory after vehicle acquisition such as at the point of sale. For example, a vehicle dealer may provide a vehicle owner with an administrator password and website access (e.g., www.syncmyride.com) for uploading a biometric identifier or code. The vehicle owner (or any other person authorized to operate the vehicle) may then upload a biometric identifier (e.g., a fingerprint scan or retinal scan) to the vehicle **121** using a biometric scanner (not shown) in the vehicle **121** or at PC **105**. If PC **105** is used, the biometric data may be downloaded to the vehicle **121** using, for example, an internet connection.

It should be understood that the arrangement of FIG. **3** is non-limiting and certain aspects may be added, deleted and/or combined. For example, and without limitation, the method may be performed without the presence of a nomadic device (e.g., entirely at the vehicle **121**) or may be performed using a personal computer (PC). Furthermore, while certain steps are illustrated as being performed at the server, vehicle, or nomadic device, the arrangement is illustrative and presented as such for clarity purposes.

One or more data packets may be transmitted from the ND **103** for transmitting the request. Non-limiting examples of data (i.e., information) transmitted in the data packets may include a mobile identification number (MIN), a customer identification number, the one or more commands triggered from the ND **103**, and the vehicle identification number (VIN).

The server(s) **101** may process the data packets for generating the authorization code. Processing the data packet(s) may include, but is not limited to, authenticating the one or more commands, authenticating the user (e.g., determining if the user is a registered user) and authenticating the cellular/mobile phone (e.g., matching the MIN to the VIN). Authentication may be accomplished using one or more look-up tables. Accordingly, server(s) **101** may communicate with one or more databases (not shown) having user authentication information.

As illustrated in block **302**, an authorization code may be generated, e.g., by server(s) **101**. In one embodiment, the authorization codes may be dynamically generated random codes. Server(s) **101** may include software for generating the dynamic codes.

The server(s) **101** may generate at least two codes that may be identical copies of each other and/or pieces of a code that are paired to form the authorization code. One or more codes (or first part of a code) may be transmitted to the nomadic device **103**, as illustrated in block **304**, and one or more second codes (or second part of the code) may be transmitted to the vehicle as illustrated in block **306**. Non-limiting examples of codes may be numbers, colors, icons, pictures, a question and answer combination, or a series of user maneuvers (e.g., and without limitation, horn honk and brake press combination). The codes may be encrypted. In one embodiment, the codes may utilize a public/private key encryption system. Furthermore, these codes may be randomly generated.

The server(s) **101** may generate the codes based on user personal preferences. The preferences may be set using a configuration tool, for example, software downloaded from a website such as www.syncmyride.com. The user may set personal preferences during configuration of the authorization software and configure the preferences from a PC, nomadic device, or the vehicle.

A non-limiting example of a preference may be the use of a fingerprint scan or retinal scan for authorization. This biometric data may be stored in server(s) **101** and/or vehicle **121** as described above. Another non-limiting preference may include a security level for obtaining authorization. For instance, the user may set the security level at "LOW," "MEDIUM" or "HIGH" or assign the security level a numeric value such as 1, 2 or 3 (e.g., 1 is a low level of security while 3 is a high level of security).

The security level for obtaining authorization may determine the complexity level of the authorization code such that the higher the security level, the greater the complexity of the authorization code. For instance, if the security level is set to "LOW," the authorization code may comprise only 2 digits to be input at the vehicle. If the security level is set to "MEDIUM," the authorization code may comprise 3 or 4 digits to be input at the vehicle. If the security level is set to "HIGH," two codes may be required to be input: (1) the 3-4 digit user code and (2) an additional code generated by the server(s) **101** and/or a biometric scan (such as a fingerprint or retinal scan). For example, this additional code may be a 12 digit encrypted server-generated rolling code transmitted from the ND **103** to a vehicle authorization system via a wireless connection (e.g., and without limitation, BLUETOOTH or WiFi). Alternatively, the 12 digit code may not be a rolling code. For example, and without limitation, the code may be a fixed code or other suitable code. Thus, authorization to operate and/or drive the vehicle may be given if the user authorization code input by the user and the vehicle driveaway authorization code correspond and the 12 digit code is received and recognized by the vehicle authorization system.

In one embodiment, the 12-digit encrypted server-generated code may be used as an additional level of authorization regardless of the security level. Along with the user authorization code, the 12-digit encrypted code may be sent to the nomadic device **103** for performing the authorization process at the vehicle.

FIG. **4** illustrates one exemplary operation of generating a code based on user preferences stored at server(s) **101**. Upon receiving the initializing command (block **300** of FIG. **3**), a request signal to generate one or more codes may be transmitted to code generation software as illustrated in block **400**. A determination may be made whether there are any stored preferences as illustrated in block **402**. If not, any random code may be generated as illustrated in block **408**. In one embodiment, the random code may be generated based on a default security level.

If personal preferences are stored, stored preferences may be accessed, as illustrated in block **404**, and retrieved, as illustrated in block **406**. The code may be configured according to the personal preferences (e.g., using a configuration algorithm) and the customized code may be generated as illustrated in block **408**.

Referring back to FIG. **3**, in one embodiment, the server(s) **101** may transmit the initialization command and the randomly generated code(s) together to the vehicle as illustrated in block **306**. In this embodiment, upon receiving the initialization command from the user (as illustrated in block **300**), the server may temporarily store or queue the initialization signal in memory until a code is generated. Upon generation of the code, the initialization command signal may be released and transmitted with the random code. It should be understood that other methods of transmitting the initialization command may be utilized without departing from the scope of the invention.

As illustrated in block **308**, the code(s) (or part of a code) may be received at the nomadic device **103**. The code(s) may be displayed to the user as illustrated in block **310**. In one embodiment, the user may be alerted to the presence of the code(s), for example, as a text message sent to the nomadic device **103**. In a further non-limiting embodiment, the code(s) may be sent to the nomadic device **103** as a digital file. In yet another non-limiting embodiment, the code(s) may be received as an e-mail.

At about the same time, the random code(s) and the initialization command signal may also be received and stored in memory at the vehicle as illustrated in block **312**. The vehicle operation/driveaway authorization process at the vehicle may commence according to blocks **314**, **316**, **318**, and **320**.

Upon receiving the initialization command from the user, a threshold authorization determination may be performed as illustrated in block **314**. Prior to receiving, or while the vehicle authorization system is awaiting receipt of, the user-input authorization code(s), the vehicle authorization system may "wake up" and search for the presence of an authorized nomadic device **103** upon receipt of the initialization command. Non-limiting examples of authorized nomadic device(s) **103** may include those that are or have been paired to the vehicle computing system or those having a recognized RFID tag. An authorized nomadic device **103** may be detected by, for example (and without limitation), a paired connection between the vehicle authorization system and the nomadic device **103** or an RFID tag scanner (not shown) in the vehicle scanning for and recognizing the nomadic device **103** based on the RFID tag.

A further determination may be made whether further authorization steps should be performed as illustrated in block **316**. If nomadic device **103** is not recognized, the vehicle **121** will stall further authorization as illustrated in block **318**. In one embodiment, the vehicle may permit entry into the vehicle, but further operation of the vehicle will be stalled. For example (and without limitation), the vehicle may not start, the gear shift (whether automatic or manual) may be locked, or the steering wheel maybe locked. 12 volt charging may remain operational to charge a nomadic device with a low battery.

If the nomadic device **103** is recognized, additional steps may be necessary for authorizing operation and/or driveaway of the vehicle as illustrated in block **320**. Further details of the authorization process will be described with respect to FIG. **5**.

In one embodiment, the user may request authorization from PC **105**. In this embodiment, the request (and the initializing signal) may be transmitted from the PC **105** and the request may be made from a website or software in a similar fashion as described above.

When the nomadic device **103** is recognized, the authorization process may then proceed to confirming that the user is authorized. User authorization may be accomplished based on a comparison of the authorization code(s) received at the vehicle **121** and input by the user at the vehicle **121**.

In the vehicle, the authorization code(s) may be entered as illustrated in block **500**. The code(s) may or may not be entered by a user. The code(s) may be input using a keyboard (e.g., located in the center stack of the vehicle), using a touch screen display, using voice-activated commands, transmitting a signal with the code via a local wireless connection (e.g., and without limitation, BLUETOOTH), and/or using a fingerprint or retinal scanner. The entered code(s) may then be compared by the vehicle authorization system with the code(s) stored at the vehicle **121** to determine if the user is authorized as illustrated in block **502**.

For example, authorization to operate the vehicle may be given if the user seeking vehicle operation and/or driveaway authorization enters the numbers "1,"2" and "3" at the vehicle corresponding to the "1-2-3" code stored in the vehicle. As another example, authorization is given to operate the vehicle if the user honks twice and pushes the brake once corresponding to the same two honks, one brake push pattern stored at the vehicle. As yet another example, authorization is given if the retinal scan performed at the vehicle corresponds to the retinal scan stored at the vehicle **121** (as described above). These non-limiting examples may or may not include the additional recognition by the vehicle of a 12-digit encrypted code (rolling, fixed, etc.) transmitted from the nomadic device **103**.

In another example, the codes may be functions of each other. For example, and without limitation, the user authorization code may be a function of the vehicle driveaway authorization code. In this non-limiting embodiment, the vehicle may store the corresponding function (which matches the code input by the user as the user authorization code) in memory and compare the user authorization code with the stored function upon a user input of the user authorization code.

Based on the code(s) that is input, a determination may be made whether the user is authorized to drive the vehicle as illustrated in block **504**. If the user is not authorized (i.e, the code(s) is incorrect or has not been entered), authorization to drive the vehicle is not given and, accordingly, operation may be stalled as illustrated in block **506**.

In one embodiment, the vehicle authorization system may lockout a user or generate a "wait" period before the authorization code may be reentered if the authorization code is input incorrectly a predetermined number of times (e.g., three) as illustrated in block **512**. As such, the user may not be able to re-enter the code until a predetermined amount of time has lapsed (e.g., two minutes) as illustrated in block **514**. In yet a further embodiment, if the threshold level has been exceeded (i.e., the code has been input more than three times), an emergency contact person may be contacted (e.g., via a cellular call made to the vehicle owner or another emergency contact) in order to deter a potential theft of the vehicle. The user may customize the threshold level during and after configuration of the authorization system.

If the user is authorized (i.e., the correct code is entered), operation of the vehicle may be authorized as illustrated in block **508**. Once authorized, one or more signals may be transmitted to one or more components of the vehicle via the vehicle network **214** as illustrated in block **510**. The user may then drive the vehicle.

While exemplary embodiments are illustrated and described above, it is not intended that these embodiments illustrate and describe all possibilities. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed:

1. A method for authorizing vehicle drive away, the method comprising:

presenting a website to register a user for participation in a vehicle drive away program;

receiving input at the website from the user requesting a vehicle drive away event;

receiving input defining a preconfigured code used for authorizing the vehicle drive away event;

generating RFID information corresponding to the user;

configuring an RFID tag with the RFID information;

receiving at least a portion of the RFID information stored on the RFID tag from an embedded cellular telephone at the vehicle;

determining whether the drive away event is authorized based at least in part on the RFID information and the preconfigured code; and

if authorized, transmitting an authorization signal to the embedded cellular telephone at the vehicle.

2. The method of claim **1** additionally comprising receiving the preconfigured code at the vehicle through a touch screen.

3. The method of claim **1** additionally comprising encrypting at least a portion of the RFID information.

4. The method of claim **1** additionally comprising displaying the preconfigured code at the website.

5. The method of claim **1** additionally comprising encrypting at least a portion of the authorization signal.

6. The method of claim **1** wherein the preconfigured code is associated with the RFID information.

7. A method for authorizing vehicle drive away, the method comprising:

presenting a website to register a user for participation in a vehicle drive away program;

receiving input at the website from a user requesting a vehicle drive away event;

associating an RFID tag with user-identifying RFID information based on the registered user and usable for authorizing the vehicle drive away event;

wirelessly receiving the RFID information from the RFID tag via an RFID receiver;

using a vehicle embedded cellular telephone to communicate authorization information between the vehicle and an authorization server for authorizing the drive away event based at least on the user-identifying RFID information;

receiving a first code used for authorizing the vehicle drive away event; and

enabling drive away of the vehicle if the first code and the RFID information is authorized.

8. The method of claim **7** additionally comprising displaying the first code at the website.

9. The method of claim **7** additionally comprising generating a second code for use in authorizing the vehicle drive away event.

10. The method of claim **9** additionally comprising communicating the second code to the vehicle embedded cellular telephone.

11. The method of claim **10** wherein the second code is wirelessly communicated to the vehicle.

12. The method of claim **9** wherein the second code is stored on an RFID tag.

13. The method of claim **9** additionally comprising encrypting the second code.

14. The method of claim **9** wherein the first code is associated with the second code.

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